

## INTISARI

Peningkatan prevalensi luka, khususnya pada kelompok masyarakat dengan keterbatasan mobilitas dan kebutuhan perawatan berkelanjutan, mendorong kebutuhan adanya layanan kesehatan yang dapat secara langsung menjangkau masyarakat seperti *Home Health Care* (HHC). Dalam praktiknya, penyelenggaraan HHC menghadapi tantangan operasional yang kompleks, terutama dalam penentuan rute dan jadwal kunjungan perawat yang efisien sekaligus mampu memenuhi preferensi dan kebutuhan pasien. Pedis Care Malang sebagai objek penelitian menghadapi permasalahan ketidakefisienan rute kunjungan, di mana waktu transportasi mencapai sekitar 15–30% dari total waktu kerja harian perawat sehingga diperlukan metode atau model yang mampu meningkatkan efisiensi rute dan penjadwalan layanan HHC. Penelitian ini bertujuan untuk mengembangkan model matematis *Home Health Care Routing and Scheduling* (HHCRS) pada kasus perawatan luka dengan mempertimbangkan karakteristik *multi-period*, *continuity of care*, *time windows*, dan *patient requirements*.

Model dikembangkan menggunakan pendekatan *Mixed Integer Linear Programming* (MILP) dengan fungsi objektif meminimalkan total waktu tempuh perjalanan perawat. Studi kasus dilakukan pada penyedia layanan perawatan luka Pedis Care Malang. Model yang diusulkan diuji melalui proses verifikasi dan validasi untuk memastikan konsistensi logika beserta kesesuaian dengan kondisi operasional di dunia nyata. Selain itu, analisis sensitivitas dilakukan terhadap beberapa parameter utama, yakni durasi kunjungan, jam kerja minimal perawat, dan jam kerja maksimal perawat untuk mengevaluasi dampak perubahan parameter terhadap keputusan penentuan rute dan penjadwalan perawat.

Hasil penelitian menunjukkan bahwa model mampu menghasilkan rute dan jadwal kunjungan yang *feasible* dan optimal dengan tetap memenuhi *continuity of care* dan kebutuhan pasien. Dibandingkan kondisi saat ini, model memberikan peningkatan kinerja dengan rata-rata pengurangan total waktu tempuh sebesar 63 menit atau sekitar 32%. Analisis sensitivitas menunjukkan bahwa durasi layanan serta jam kerja minimal dan maksimal perawat memberikan dampak terhadap hasil penentuan rute dan penjadwalan perawat. Secara keseluruhan, model yang dikembangkan dapat menjadi alat bantu pengambilan keputusan bagi penyedia layanan HHC dalam meningkatkan efisiensi operasional dan kualitas layanan perawatan luka.

**Keywords:** model optimasi, *home health care routing and scheduling*, *mixed integer linear programming*, kebutuhan pasien, *time windows*, *continuity of care*

## ABSTRACT

*The increasing prevalence of wounds, particularly among populations with limited mobility and the need for continuous care, has intensified the demand for healthcare services that can directly reach patients, such as Home Health Care (HHC). In practice, the provision of HHC faces complex operational challenges, especially in determining efficient nurse routing and visit scheduling while simultaneously accommodating patient preferences and requirements. Pedis Care Malang, as the object of this study, encounters inefficiencies in visit routes, where transportation time accounts for approximately 15–30% of nurses' total daily working time. This condition highlights the need for methods or models capable of improving the efficiency of HHC routing and scheduling. This study aims to develop a mathematical model for the Home Health Care Routing and Scheduling (HHCRS) problem in wound care services by considering multi-period characteristics, continuity of care, time windows, and patient requirements.*

*The model is developed using a Mixed Integer Linear Programming (MILP) approach with the objective of minimizing the total travel time of nurses. A case study is conducted at Pedis Care Malang as a wound care service provider. The proposed model is tested through verification and validation processes to ensure logical consistency and conformity with real-world operational conditions. In addition, sensitivity analysis is performed on several key parameters, namely visit duration, minimum nurse working hours, and maximum nurse working hours, to evaluate the impact of parameter changes on routing and scheduling decisions.*

*The results show that the model can generate feasible and optimal visit routes and schedules while satisfying continuity of care and patient requirements. Compared to current operational conditions, the model improves performance by reducing total travel time by an average of 63 minutes, or approximately 32%. Sensitivity analysis indicates that service duration as well as minimum and maximum nurse working hours significantly affect routing and scheduling outcomes. Overall, the developed model can serve as a decision-support tool for HHC service providers in improving operational efficiency and the quality of wound care services.*

**Keywords:** *optimization model, home health care routing and scheduling, mixed integer linear programming, patient requirements, time windows, continuity of care*